Alg. 2 Warm Up # 4-5

1. Solve for y: $2x + \frac{1}{y} = 3$

2. Write an equation and solve:

A cable 84 meters long is cut into two pieces. One piece is 18 meters longer than the other. Find the length of each piece of cable.

3. Find the point of intersection of the 2 lines:

$y = 3x + 15$ and $y = 3 - 3x$

1. Solve for y: $2x + \frac{1}{y} = 3$

2. Write an equation and solve:

A cable 84 meters long is cut into two pieces. One piece is 18 meters longer than the other. Find the length of each piece of cable.

Preview

HW Questions:

1-84. Use any method to find the points of intersection of $f(x) = 2x^2 - 3x + 4$ and $g(x) = x^2 + 5x - 3$.

$$2x^2 - 3x + 4 = x^2 + 5x - 3$$

$$x^2 - 8x + 7 = 0$$

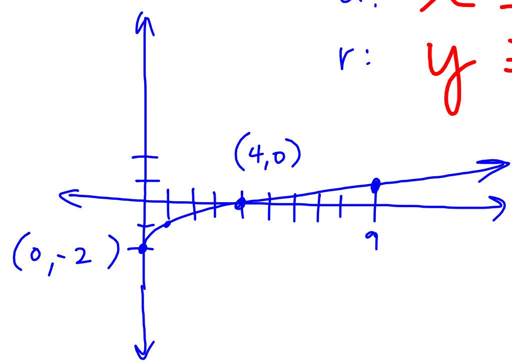
$$(x-7)(x-1) = 0 \rightarrow x - 7 = 0 \text{ or } x - 1 = 0$$

(7

(1,

$\boxed{\text{1-86.}}$ Make a complete graph of the function $f(x) = \sqrt{x} - 2$, label its x- and y-intercepts, and describe its domain and range.

x	y
0	-2
1	-1
4	0
9	1



d: $x \geq 0$

r: $y \geq -2$

1-88. Carlo got a pet snake as a birthday present. On his birthday, the baby snake was just 26 cm long. He has been watching it closely and has noticed that it has been growing 2 cm each week.

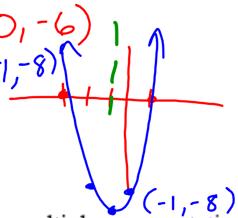
let x = # of weeks

$$26 + 2x$$

1-90. Make a complete graph of the function $h(x) = 2x^2 + 4x - 6$ and describe its domain and range.

x-int: $(-3, 0)$ & $(1, 0)$
y-int: $(0, -6)$
vertex: $(-1, -8)$

d: $x = \mathbb{R}$
r: $y \geq -8$



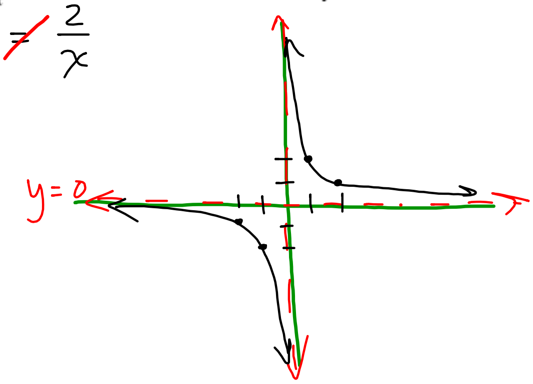
$0 = 2(x^2 + 2x - 3)$
$0 = 2(x+3)(x-1)$

$x+3=0 \quad x-1=0$
$x=3 \quad x=1$
$(3,0) \quad (1,0)$

1-92. Create multiple representations ($x \rightarrow y$ table, graph, and equation) of the function $g(x) = \frac{2}{x}$. Then make at least 3 summary statements.

x	y
-2	-1
-1	-2
0	undef.
1	2
2	1

$0 \neq \frac{2}{x}$



$x=0$

1-94. The *Salami and More Deli* sells a 5-foot submarine sandwich for parties. It weighs 8 pounds. Assuming that the weight per foot is constant, what would be the length of a 12-pound sandwich?

1-96. Graph the following equations.

a. $y - 2x = 3$

b. $y - 3 = x^2$

$(\quad , 0)$ $(0, \quad)$

c. State the x- and y-intercepts for each equation.

d. Where do the two graphs cross? Show how you can find these two points without looking at the graphs.

solve both equations for y, then set them =.

$$\left.\begin{aligned} y &= 2x + 3 \\ y &= x^2 + 3 \end{aligned}\right\}$$

$$x^2 + 3 = 2x + 3$$

$$x^2 - 2x = 0$$

$$x(x - 2) = 0$$

$$x = 0 \qquad x = 2$$

$(0, \quad)$

$(2, \quad)$

Methods and Meanings

p. 6

Math Notes

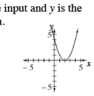
In your math spiral:

Functions

A relationship between inputs and outputs is a **function** if there is no more than one output for each input. Functions are often written as $y =$ some expression involving x, where x is the input and y is the output. The following is an example of a function.

$$y = (x-2)^2$$

x	-2	-1	0	1	2	3	4	5
y	16	9	4	1	0	1	4	9

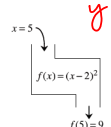


In the example above the value of y depends on x, so y is also called the **dependent variable** and x is called the **independent variable**.

x y

Another way to write a function is with the notation "$f(x) =$" instead of "$y =$". The function named "f" has output $f(x)$. The input is x.

In the example at right, $f(5) = 9$. The input is 5 and the output is 9. You read this as, "f of 5 equals 9."



$(5, 9)$

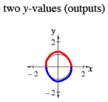
y x

The set of all inputs for which there is an output is called the **domain**. The set of all possible outputs is called the **range**. In the example above, notice that you can input any x-value into the equation and get an output. The domain of this function is "all real numbers" because any number can be an input. The outputs are all greater than or equal to zero, so the range is $y \geq 0$.

$x^2 + y^2 = 1$ is not a function because there are two y-values (outputs) for some x-values, as shown below.

$$x^2 + y^2 = 1$$

x	-1	0	0	1
y	0	-1	1	0



$$x^2 + y^2 = 1$$

$$\sqrt{y^2} = \pm\sqrt{1 - x^2}$$

$$y = \sqrt{1 - x^2}$$

$$y = -\sqrt{1 - x^2}$$

METHODS AND MEANINGS p.18

MATH NOTES

Domain and Range

The set of possible values for the input of a function is called the domain of the function. This set consists of every input value for x for which the function is defined.

The range of a function is the set of possible values of the output. This set contains every y-value that the function can generate.

Domain and **range** are often written with **inequality notation** as shown in the examples below.

The symbols $-\infty$ and ∞ represents positive and negative infinity. They mean that the domain goes on without ending in the positive or negative direction. Infinity is not a number; it is a concept.

If the domain is any number between and including –2 and 7:	$-2 \le x \le 7$
If the range is any number greater than but excluding 4:	$y > 4$ or $4 < y < \infty$
If the domain is all real numbers except for –3:	$x \ne -3$
If the domain is all real numbers:	$-\infty < x < \infty$

$x = \mathbb{R}$

METHODS AND MEANINGS p. 10

MATH NOTES

Linear Equations

x' y'

A linear equation is an equation that forms a line when it is graphed. This type of equation may be written in several different forms. Although these forms look different, they are equivalent; that is, their graphs are all the same line. → integers

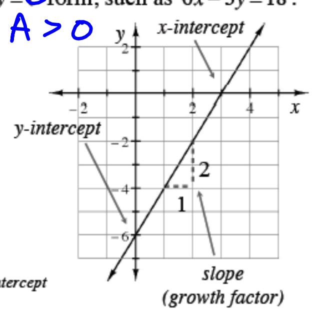
Standard Form: An equation in $ax + by = c$ form, such as $6x - 3y = 18$. A B C

$A > 0$

Slope-Intercept Form: An equation in $y = mx + b$ form, such as $y = 2x - 6$.

You can find the **slope** (also known as the **growth factor**) and the **y-intercept** of a line in $y = mx + b$ form quickly. For the equation $y = 2x - 6$, the slope is 2, while the y-intercept is (0, –6).

$y = \underset{\uparrow \text{ slope}}{2}x - 6 \leftarrow$ *y-intercept*



plot : (0, b)
use slope to get 2nd pt.

METHODS AND MEANINGS p. 24

MATH NOTES

Solving a Quadratic Equation

In a previous course, you learned how to solve **quadratic equations** (equations that can be written in the form $ax^2 + bx + c = 0$). Review two methods for solving quadratic equations below.

Some quadratic equations can be solved by **factoring** and then using the **Zero Product Property**. For example, the quadratic equation $x^2 - 3x - 10 = 0$ can be rewritten by factoring as $(x-5)(x+2) = 0$. The Zero Product Property states that if $ab = 0$, then $a = 0$ or $b = 0$. So if $(x-5)(x+2) = 0$, then $(x-5) = 0$ or $(x+2) = 0$. Therefore, $x = 5$ or $x = -2$.

Another method for solving quadratic equations is using the **Quadratic Formula**. This method is particularly helpful for solving quadratic equations that are difficult or impossible to factor. Before using the Quadratic Formula, the quadratic equation you want to solve must be in standard form (that is, written as $ax^2 + bx + c = 0$).

In this form, a is the coefficient of the x^2-term, b is the coefficient of the x-term, and c is the constant term. The Quadratic Formula is stated at right.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

This formula gives two possible solutions for x. The two solutions are shown by the "$\pm$" symbol. This symbol (read as "plus or minus") is shorthand notation that tells you to evaluate the expression twice: once using addition and once using subtraction. Therefore, Quadratic Formula problems usually must be simplified twice to give:

$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{or} \quad x = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

Of course if $\sqrt{b^2 - 4ac}$ equals zero, you will get the same result both times.

To solve $x^2 - 3x - 10 = 0$ using the Quadratic Formula, substitute $a = 1$, $b = -3$, and $c = -10$ into the formula, as shown below, then simplify.

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-10)}}{2(1)} = \frac{3 \pm \sqrt{49}}{2} = \frac{3+7}{2} \text{ or } \frac{3-7}{2}$$

$$x = 5 \quad \text{or} \quad x = -2$$

METHODS AND MEANINGS p. 29

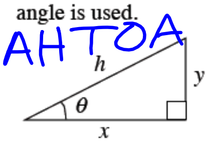
MATH NOTES

Triangle Trigonometry

There are three **trigonometric ratios** you can use to solve for the missing side lengths and angle measurements in any right triangle: tangent, sine, and cosine.

In the triangle below, when the sides are described relative to the angle θ (the Greek letter "theta"), the opposite leg is y and the adjacent leg is x. The hypotenuse is h regardless of which acute angle is used.

SOH CAH TOA



$$\tan\theta = \frac{\text{opposite leg}}{\text{adjacent leg}} = \frac{y}{x}$$

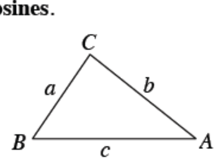
$$\sin\theta = \frac{\text{opposite leg}}{\text{hypotenuse}} = \frac{y}{h}$$

$$\cos\theta = \frac{\text{adjacent leg}}{\text{hypotenuse}} = \frac{x}{h}$$

Rt Δ's

Not Rt Δ

In general, for any uniquely determined triangle, missing sides and angles can be determined by using the **Law of Sines** or the **Law of Cosines**.



$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

and

$$c^2 = a^2 + b^2 - 2ab\cos C$$

Finding intersections:

Method

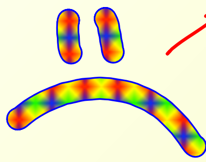
with Algebra:

① Equal Values

② Substitution

③ Elimination

with Graphing:



① Graph & guess where it looks like they cross

☆ ② Use calc function on grapher

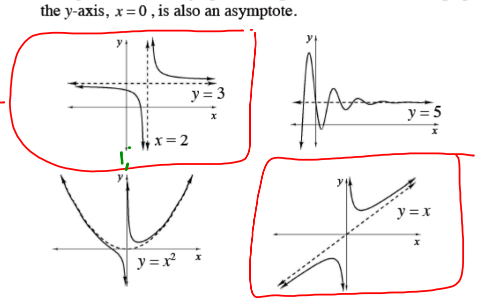
METHODS AND MEANINGS p.37

MATH NOTES

Graphs with Asymptotes

A mathematically clear and complete definition of an asymptote requires some ideas from calculus, but some examples of graphs with **asymptotes** should help you recognize them when they occur. In the following examples, the dotted lines are the asymptotes, and the equations of the asymptotes are given. In the two lower graphs, the y-axis, $x = 0$, is also an asymptote.

$y = \frac{\quad}{x-2}$



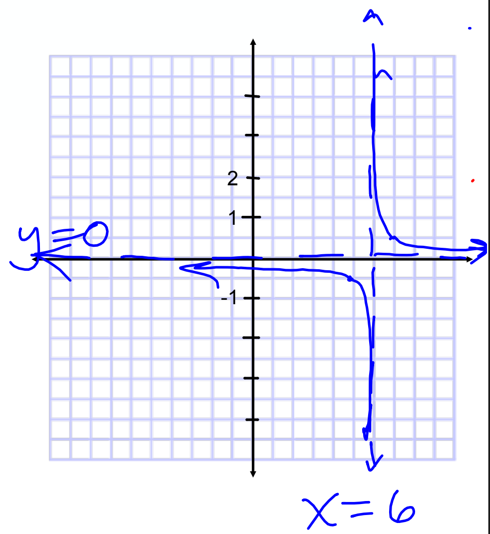
As you can see in the examples above, asymptotes can be diagonal lines or even curves. However, in this course, asymptotes will almost always be horizontal or vertical lines. The graph of a function has a **horizontal asymptote** if as you trace along the graph out to the left or right (that is, as you choose x-coordinates farther and farther away from zero, either toward infinity or toward negative infinity), the distance between the graph of the function and the asymptote gets closer to zero.

A graph has a **vertical asymptote** if, as you choose x-coordinates closer and closer to a certain value, from either the left or right (or both), the y-coordinate gets farther away from zero, either toward infinity or toward negative infinity.

Green CP's:

for $y = \frac{1}{x - 6}$

x	y
3	
4	
5	
6	$\varnothing$
7	
8	
9	



dom: $x \neq 6$

range: $y \neq 0$

Week 4 CP's:

Warm up on top

1- #53, 55--->57 (tan)

1- #78/79 (Green)

HW: 1-

#104 ----> 110